

Six Sigma and RFID – Enabling process improvement



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Two seemingly independent initiatives that are capturing the attention of corporate managers are Six Sigma and RFID (Radio Frequency Identification). Six Sigma is largely considered to be a powerful management discipline, and RFID is best described as an enabling technology.

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For a background or primer on RFID, two whitepapers from UPS Supply Chain Solutions entitled “Demystifying RFID in the Supply Chain: An Overview of the Promise and the Pitfalls” and “A Framework for Developing an RFID and Auto-ID Strategy” can be found at ups-scs.com. With an increasing number of companies under mandates from customers to provide RFID-enabled fulfillment, it is time to evaluate how business processes are managed and enabled. As an overview of Six Sigma, Exhibit One introduces some of the major components of this problem-solving approach.

This paper illustrates how these two initiatives can be complementary, especially for “Greenfield” process improvements – where opportunities exist to design work methods and standards from the ground up. The intersection of Six Sigma and RFID offers companies the ability to balance demand with the supply of process-centric information. Both of these change programs provide abundance of data, but the data may neither be sufficiently qualitative nor quantitative. This is where RFID as an enabler may be quite useful.

Over the past decade, a growing list of companies have embraced the central concepts of the Six Sigma methodology, made popular by Motorola and General Electric. Like other recent quality management disciplines — Total Quality Management and Business Process Re-Engineering — Six Sigma can mean a wide variety of things. It can be a general change program that loosely follows the D-M-A-I-C methodology (*see Exhibit 1*) to a more literal measurement and improvement of the actual sigma level for a system. This paper focuses on the more restrictive interpretation of Six Sigma, where measurement and improvement of metrics are integral to the design, execution and overall success of a project.

In the hands of experienced managers, Six Sigma can help companies achieve performance levels that externally are invaluable to customers and internally can reduce costs. These projects can now be found in very diverse industries and can span far-reaching

business processes and geographies. A recent discussion with a major healthcare company revealed that the company has over 25 Six Sigma projects currently in progress and has certified over 100 new Black Belts.

Exhibit 1 Six Sigma Primer¹

Six Sigma - A business discipline that combines a structured process-improvement methodology with an array of tools that help manage the achievement of objectives. The objectives of most Six Sigma projects are specific and measurable, such as "improving the preferred customer order cycle time to 99.99% on-time performance level." Other objectives might be expressed in "mean time between failure (MTBF)" or other process-centric terms.

DMAIC (Define-Measure-Analyze-Improve-Control) - An acronym that describes the key phases of the Six Sigma methodology. Each phase has defined tasks and objectives to be completed as a foundation for other ones.

- DEFINE the goals of the improvement program
- MEASURE the existing system
- ANALYZE the system to identify ways to eliminate performance gaps
- IMPROVE the system
- CONTROL the new system

Sigma (6) Level - The ability of a given process (such as order fulfillment) to perform defect-free work. Sigma is a statistical measurement of process variation.

Defect - Anything that causes a customer to become dissatisfied. Customers may be internal or external and are sometimes defined as the next stakeholder in the process.

DPMO - Defects Per Million Opportunities, a key metric in Six Sigma that is a focus of reduction efforts.

Six Sigma Performance - A very restrictive level of performance that many companies never reach. It literally means exceeding 99.99% defect-free performance for a given business process. It is estimated that many best-in-class companies operate more in the 1 Sigma range.

Process Capability - The measured ability of a process to operate within its specification limits (between the upper and lower specifications).

Black Belt - A designation for a person who has successfully managed Six Sigma projects, completed testing on the subject matter, completed prior belt requirements and is responsible for attaining the results of the successful project.

¹ *The Six Sigma Handbook*, Thomas Pyzdek, 2003

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The Business Problem

Always critical to the performance of a Six Sigma project is how well the objectives are defined. The definition stage often reveals the data requirements needed for the next step in the process, or the **measurement** phase. Often Six Sigma projects kick off with great anticipation, only to find insufficient or inadequate data to perform the “M” component of D-M-A-I-C.

The reasons for poor or non-existent data can be numerous, but generally three primary reasons are offered. First, the need for additional data was not identified prior to the process-measurement effort. Second, the labor and other costs of acquiring the data circumvented the efforts to obtain it. Finally, the measurement systems required to capture and store the data are often not in place.

With some limitations, RFID may be the means to acquiring more comprehensive, accurate, and time-sensitive data particularly when the characteristics to be measured include location changes, duration, temperature, pressure and humidity changes, and the like. By combining radio frequency tags, readers and information networks, RFID can automatically capture and manage data for process automation, asset tracking, error prevention, identity assurance and a host of other applications.

How RFID Might Help

Because RFID offers the potential to collect and store data without human intervention, the technology can provide a relatively low-cost solution when spread over a large number of units. When compared to the costs of data entry or manual scanning of barcodes, RFID may be a better, more economical solution for many firms. In the absence of a process measurement system, RFID may provide visibility and process insights that can identify issues early in their lifecycle, and supplement the “M” component of the Six Sigma process.

Case Example One

A healthcare firm recently engaged UPS Supply Chain Solutions to provide an RFID-based solution for inventory management in the manufacturer-hospital supply chain. Since the medical devices it needs are very costly and highly sensitive to temperature, the stakes for keeping the inventory within environmental tolerances and specifications are high. Currently, there is no way to monitor temperature ranges of the devices once they have shipped. RFID can assure that devices are kept within specified temperature ranges to

help mitigate risks to patients because RFID sensors can record and broadcast location, temperature and other environmental data for end-to-end visibility. Six Sigma can be significantly enriched by substituting the existing “gut feel” management of the process with improvements that utilize real-time facts and data. The sensors and RFID network provide the inputs for measurement, while Six Sigma offers the process design and discipline techniques.

Case Example Two

For consumer-product firms a common Six Sigma project involves order cycle times - the elapsed time from order receipt to order shipment. Companies realize that speed of fulfillment is both important to customer satisfaction and to the speed of payments. However, many companies can do little more than measure the elapsed time without costly interim timestamps and location data that can help determine where slowdowns occur.

In 2005, many consumer products firms will be applying passive RFID tags to pallets and cases for major customers. With some process design and technology improvements these companies may find many upstream uses for reading and collecting data from the tags they are being mandated to apply. Perhaps the measurement and improvement of order cycle times could be one of the outcomes. Here again is an opportunity for the intersection of these two initiatives – Six Sigma and RFID — to do more together than alone.

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Summary

Investment in Six Sigma programs is typically justified or driven by a distinct customer benefit or internal cost savings. It is often internally driven. On the other hand, RFID is being externally driven by customer mandates, and this trend will likely continue. Companies should consider both of these process changes as opportunities to enhance their own business practices, source internal benefits, improve operations and recognize new cost savings.

About the Author

Michael Sullivan is a Principal at UPS Supply Chain Solutions. Michael is based in Atlanta, GA and can be reached at 678.746.4511 or msullivan@ups-scs.com.

To learn more about how our experience in supply chains and consulting can help your business, please contact us:

1.800.742.5727 U.S.
1.678.746.4365 International
Visit us at ups-scs.com

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